ABSTRACT

A micromanipulator comprising a tubular structure and a structural compliance mechanism that are formed from a tube made of an elastic and/or superelastic material. Fabricated with laser machining and has no mechanical joints, the micromanipulator can be manipulated in various motions and degree-of-freedoms without permanent deformation. Shape Memory Alloys (SMAs) in one embodiment are implemented as main actuators of the micromanipulator. The micromanipulator can be implemented with multiple SMAs to manipulate the mechanism with multiple degree-of-freedom. In another implementation, multiple segments of the mechanisms are formed and arranged in various configurations, including a "double-helix"-like configuration, for enabling intricate motions of the micromanipulator. The micromanipulator is useful for intravascular interventional applications and particularly ultrasonic imaging when coupled with an ultrasound transducer.